Methods: A total of 217 strains of S. pneumoniae obtained from invasive (blood, CSF, pleural fluid) and non-invasive sites (respiratory sites) of both pediatric and adult patients were serotyped by the method of Pai et al (2006). Strains were identified by standard methods and their antibiotic resistance profile determined by agar dilution method (PEN, ERY, CRO, CTX, CXM, CIP, GAT, MOX, LVX) and disk diffusion (PEN, ERY, CRO, CXM, AMC, AMP, VAN, SXT, CL, CN10, DA, OX, CIP). Seven different multiplex PCRs were used to determine the following serotypes/serogroups: 1, 2, 3, 4, 5, 8, 13, 14, 20, 21, 31, 34, 37, 38, 39, 40, 44, 46, 6A, 7A, 7B, 7C, 7F, 9A, 9N, 9L, 9L, 10A, 10F, 11A, 11D, 11F, 12A, 12B, 12F, 15A, 15B, 15C, 15F, 16A, 16F, 17F, 33A,35B, 35F, 35A, 35C, and 47F. The cps operon was used as the internal positive control.

Results: Of the 217 strains, there were 22.6% PRSP, 27.7% PISP and 49.8% PSSP strains based on their susceptibility to penicillin. Serotypes detected were the 19F, 18C, 15B/C, 23F, 6A/B, 10A, 12A/F, 3, 14, 11A/D, 34, 19A, 16F, 35F/47F, and 7F/A. The most predominant serotype was 19F and it was also predominant in isolates obtained from invasive sites. Serotype 19F and 23F were observed to be common among the PRSP strains, with 35/49 strains serotyped as 19F while 13/49 strains were serotyped as 23F. Only one PRSP strain was serotyped as 34. Serotype 19F was also predominant among the PISP strains. Other serotypes detected among the PISP strains were 6A/B, 11A/D, 23F and 14. However, the distribution of these serotypes were rare. The PSSP strains showed to have other serotypes such as 18C, 15B/C, 6A/B, 10A, 19A, 3, 14, 16F, & 7B/C, 7F and 35F/47F. The distribution of serotype 19F and 23F was rare among this group of isolates.

Conclusion: In conclusion, we observe serotype 19F and 23F to be prevalent among the penicillin resistant strains, which has been included in the 7-valent conjugate vaccine. Therefore, the efficacy of this vaccine should be effective in our population. However, it is not possible to predict serotypes that might become predominant in the future.

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44.024

Rapid Consumption of Vancomycin in the Presence of Beta-Lactam Antibiotics Causes Beta-Lactam Antibiotic-Induced Vancomycin-Resistance in Methicillin-resistant Staphylococcus aureus

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Background: One may treat MRSA infections by combination of vancomycin (VCM) with β-lactam antibiotics. Such a combination therapy, however, often causes emergence of VCM-resistant MRSA. The mechanism of this phenomenon, β-lactam antibiotic-induced VCM-resistance (BIVR), is the subject of our investigation to be elucidated. Currently up to 20% of blood isolated MRSA are found to be BIVR strains. Here we report the accelerated consumption of free VCM by the

Methods: A representative BIVR strain, BIVR744 (MIC: VCM 4 mg/L), was selected under various rationale and used throughout the experiments. Free VCM in the medium was quantified by a competitive-ELISA that enabled us to detect the decrease of free VCM at the level of 0.1 μg/mL. Morphological changes of cells grown with VCM and those with VCM+ceftizoxime (CZX) were compared by electron microscopy. Penicillin binding proteins (PBP_S) 2 and 2′ were determined by the fluorescent method.

Results: Growth of BIVR744 in the presence of 4 mg/L VCM took 27 h to reach A578 = 1.0, whereas it was only 8 h under coexistence of 1mg/L CZX. Without CZX, free VCM remained >2.1 mg/L in the first 24 h and the growth was inhibited. On the other hand, in the presence of 1 mg/L CZX, VCM decreased to 0.5 mg/L at 8 h resulting the growth to A578 = 1.44. During inhibited by VCM, thickened cell walls were observed in both cells cultivated with and without CZX, however, the grown cells in the presence of CZX showed normal morphology. CZX showed no effect on the amount of PBP2 and 2′ although BIVR 744 contains large quantities of them.

Conclusion: It was concluded that the BIVR phenomenon is attributable to the accelerated VCM consumption by coexisted β-lactam antibiotics.

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44.025

Current Susceptibility Patterns for *Streptococcus pneumoniae* Isolates from Europe and Asia: Findings of the 2007 GLOBAL Surveillance Program

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Background: Resistance (R) to penicillin (PEN), macrolides, and other commonly prescribed agents used to treat community-acquired respiratory tract infections caused by *S. pneumoniae* (SP) has become prevalent. Often, these organisms can be multi-drug resistant (MDR) which is especially problematic for clinicians. Investigation of regional trends in susceptibility (S) patterns and careful consideration of MDR prevalence can provide useful information for empiric treatment. The GLOBAL Surveillance program was designed to monitor the S patterns of SP on a regional level.

Methods: During 2007, 1547 SP were collected from 5 countries in Europe (EU; France [FR], Germany [GE], Italy [IT], Spain [SPN], Belgium [BG], and the United Kingdom [UK] and 554 SP were collected from 4 regions in Asia (AS; Hong Kong [HK], South Korea [SK], China [CH], and Taiwan [TW]). All isolates were centrally tested by broth microdilution (CLSI M7-A7, 2006) against levofloxacin (LFX) and 12 comparator agents. MIC results were interpreted according to CLSI M100-S17, 2007. For SP, MDR was defined as R to ≥2 of the following agents: PEN, cefuroxime (CFX), erythromycin (ERY), tetracycline (TET), and trimethoprim-sulfamethoxazole (SXT).

Results: Overall, among SP isolates in AS and EU respectively, S rates were 39.2 and 75.2% for PEN; 45.5 and 82.5% for CFX; 21.1 and 67.4% for ERY; 19.3 and 75.6% for TET; 37.2 and 74.6% for SXT; and 98.0 and 98.8% for LFX. For all countries combined the prevalence of MDR SP was 77.4% in AS and 29.1% in EU. The most prevalent MDR phenotype in AS was 5-drug R (including PEN, ERY, CFX, TET, and SXT) and in EU it was 2-drug R (including ERY and TET). Among MDR isolates, 97.4% in AS and 97.8% in EU were S to LFX. By country, the MDR rates (%) in EU were as follows: 42.7 FR; 37.9 IT; 37.2 SPN; 26.7 BG; 16.1 GE; and 9.4 UK. Comparatively, the MDR rates in AS by region were dramatically higher (66.9% HK, 76.7% SK, 85.6% CH, and 90.6% TW).

Conclusions: Decreased S among many commonly utilized respiratory agents against SP, in particular beta-lactams and macrolides, continues to be an issue in both EU and AS. However, SP remained >98% S to LFX in both regions. MDR rates among SP is also a concern in AS (77%) and EU (29%), although rates varied by country. Continued surveillance on a regional basis is warranted to monitor changes in S among SP and to help guide local empiric therapy.

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Nationwide Surveillance of *in vitro* Activities of Tigecycline against Clinical Isolates of Gram-Positive Bacteria in Taiwan: Broth Microdilution Method vs. the E test

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Background: The Tigecycline In-Vitro Surveillance in Taiwan (TIST), initiated in 2006, is a nationwide surveillance program designed to monitor longitudinally the in vitro activities of tigecycline against commonly encountered resistant bacteria in Taiwan. This study, part of TIST-2006 study, aims to compare the in vitro activities of tigecycline against clinical isolates of Gram-positive bacteria.

Methods: A total of 805 isolates of Gram-positive bacteria were collected from various sources of patients treated at 20 teaching hospitals. Minimum inhibitory concentrations (MICs) for tigecycline of these isolates were determined by the broth microdilution methods according the guidelines described by Clinical and Laboratory Standards Institute (CLSI) and the E test as manufacturer's description. Susceptibility results of tigecycline were interpreted by the MIC criteria provided by U.S. FDA. Agreement and error analysis of results generated by two methods were also evaluated.

Results: Susceptibility results of tigecycline are summarized in the table 1. Agreement of two methods was low: 70.8% for MRSA, 26.4% for *S. pneumoiae*, 20.5% for other *Streptococcus* species, and 30.7% for VRE. There was no very major or major error noted.

Conclusion: Tigecycline exhibited excellent in vitro activities against gram-positive *cocci*, including MRSA, VRE, and penicillin-nonsusceptible *S. pneumoiae* (PNSSP) isolates in Taiwan. Correlations between MIC values using broth microdilution and the E test methods for these organisms were poor.

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44.027

Detection of Heterogeneously Vancomycin Intermediate Resistant (hVISA) *Staphylococcus aureus* from Blood Stream Infections (BSI)

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Background: There is evidence that hetero-resistance may be associated with failure of vancomycin therapy. Most routine MIC testing methods used in diagnostic laboratories do not detect hVISA strains. There are few published Canadian studies using other methods for this purpose.

Objective: To use the Macro E-test method and the Glycopeptide Resistance Detection (GRD) E-test (AB Biodisk, Sweden)to assess the prevalence of hVISA among the bacteremic isolates of *S. aureus* at a tertiary care centre in Canada.

Methods: Ninety two isolates of *S. aureus* including 7 Methicillin Resistant *S. aureus* (MRSA) from BSI were tested by standard, Macro E-test and GRD methods. For the standard E-test, the organism was tested at 0.5 McFarland on Mueller Hinton (MH)Agar, and incubated for 24 hours at 35 °C. For Macro *E*-test, 100 μl of a 2.0 McFarland suspension was used on BHI Agar incubated for 48 hours at 35 °C. For GRD, 0.5 McFarland inoculum was tested on MH with 5% blood, incubated for 48 hours at 35 °C.A strain was defined as hVISA if it had an MIC of (>) 8 μg/ml for vancomycin and teicoplanin by Macro or GRD E-test.

Results: All the isolates were sensitive to vancomycin and teicoplanin, when tested by the standard method. The MIC_{50} and MIC_{90} were: vancomycin 1.0 μg/ml and 1.5 μg/ml; teicoplanin 0.5 μg/ml and 0.75 μg/ml. Though hVISA was not detected among the 92 strains tested by Macro E-test method as per the defined criteria, some strains showed increased MICs (6.0 μg/ml). MIC_{50} and MIC_{90} were: vancomycin 3.0 μg/ml and 6.0 μg/ml; teicoplanin 3.0 μg/ml and 6.0 μg/ml.The MIC_{50} and MIC_{90} by GRD were: vancomycin 1.0 μg/ml and 1.5 μg/ml; teicoplanin 2.0 μg/ml and 3.0 μg/ml.